

# Chapter 6 Running Water and Groundwater

## Summary

### 6.1 Running Water

☛ Water constantly moves among the oceans, the atmosphere, the solid Earth, and the biosphere. This unending circulation of Earth's water supply is the water cycle.

- Energy from the sun and gravity power the water cycle.
- **Infiltration** is the movement of surface water into rock or soil through cracks and pore spaces.
- Plants also absorb water and release it into the atmosphere through **transpiration**.

☛ Balance in the water cycle means the average annual precipitation over Earth equals the amount of water that evaporates.

☛ The ability of a stream to erode and transport materials depends largely on its velocity.

- **Gradient** is the slope or steepness of a stream channel.
- A **stream channel** is the course the water in a stream follows.
- The **discharge** of a stream is the volume of water flowing past a certain point in a given unit of time.

☛ While gradient decreases between a stream's headwaters and mouth, discharge increases.

- A **tributary** is a stream that empties into another stream.

☛ Base level is the lowest point to which a stream can erode its channel.

- There are two types of base level—ultimate base level and temporary base level. Sea level is the ultimate base level. Temporary base levels include lakes and main streams that act as base level for their tributaries.
- A stream in a broad, flat-bottomed valley that is near its base level often develops a course with many bends called **meanders**.

### 6.2 The Work of Streams

☛ Streams generally erode their channels lifting loose particles by abrasion, grinding, and by dissolving soluble material.

- Increased turbulence equals greater erosion.

☛ Streams transport sediment in three ways.

1. in solution (dissolved load)
2. in suspension (suspended load)
3. scooting or rolling along the bottom (bed load)

**Chapter 6 Running Water and Groundwater**

- **Bed load** is the sediment that is carried by a stream along the bottom of its channel.
  - The **capacity** of a stream is the maximum load it can carry.
- ➡ **Deposition occurs as streamflow drops below the critical settling velocity of a certain particle size. The sediment in that category begins to settle out.**
- The sorted material deposited by a stream is called **alluvium**.
  - A **delta** is an accumulation of sediment formed where a stream enters a lake or ocean.
  - A **natural levee** is a ridge made up mostly of coarse sediments that parallels some streams.
- ➡ **A narrow V-shaped valley shows that the stream's primary work has been downcutting toward base level.**
- A **floodplain** is the flat, low-lying portion of a stream valley subject to periodic flooding. It is caused by the side-to-side cutting of a stream close to base level.
- ➡ **Most floods are caused by rapid spring snow melt or storms that bring heavy rains over a large region.**
- A **flood** occurs when the discharge of a stream becomes so great that it exceeds the capacity of its channel and overflows its banks.
- ➡ **Measures to control flooding include artificial levees, flood control dams, and placing limits on floodplain development.**
- ➡ **A drainage basin is the land area that contributes water to a stream.**
- An imaginary line called a **divide** separates the drainage basins of one stream from another.

**6.3 Water Beneath the Surface**

- ➡ **Much of the water in soil seeps downward until it reaches the zone of saturation. The zone of saturation is the area where water fills all of the open spaces in sediment and rock. Groundwater is the water within this zone.**
- The upper limit of the zone of saturation is the **water table**.
- ➡ **Groundwater moves by twisting and turning through interconnected small openings. The groundwater moves more slowly when the pore spaces are smaller.**
- **Porosity** is the volume of open spaces in rock or soil.
  - The **permeability** of a material is its ability to release a fluid.
  - Permeable rock layers or sediments that transmit groundwater freely are **aquifers**. Aquifers are the source of well water.

## Chapter 6 Running Water and Groundwater

**➤ A spring forms whenever the water table intersects the ground surface.**

- A **spring** is a flow of groundwater that emerges naturally at the ground surface.
- A **geyser** is a hot spring in which a column of water shoots up with great force at various intervals.
- A **well** is a hole bored into the zone of saturation.
- In an **artesian well**, groundwater rises on its own under pressure.

**➤ Overuse and contamination threatens groundwater supplies in some areas.**

- Supplies of groundwater are finite.

**➤ Groundwater erosion forms most caverns at or below the water table in the zone of saturation.**

- A **cavern** is a naturally formed underground chamber.
- **Travertine** is a type of limestone formed over great spans of time from dripping water containing calcium carbonate. The resulting cave deposits are known as dripstone.

**➤ Karst areas typically have irregular terrain, with many depressions called sinkholes.**

- **Karst topography** an area that has been shaped largely by the dissolving power of groundwater, and has a land surface with numerous depressions called sinkholes.
- A **sinkhole** is a depression made in a region where groundwater has removed soluble rock.